

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD**

**SUBJECT: AIR QUALITY/
METEOROLOGY**

PRESENTER: GROVER H. PROWELL

**PRESENTER'S TITLE
AND ORGANIZATION: METEOROLOGIST
SCIENCE APPLICATIONS INTERNATIONAL CORPORATION**

**PRESENTER'S
TELEPHONE NUMBER: (702) 794-7234**

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OBJECTIVES OF AIR QUALITY/METEOROLOGY MONITORING PROGRAMS

- 1. CHARACTERIZE METEOROLOGICAL CONDITIONS AT THE SITE**
- 2. MONITOR THE EFFECTS OF SITE CHARACTERIZATION ON AIR QUALITY (PRIMARILY PARTICULATES)**
- 3. GATHER DATA REGARDING PARTICULATES AND CRITERIA POLLUTANTS TO SATISFY POTENTIAL STATE REGULATORY REQUIREMENTS**
- 4. PROVIDE INPUT TO RADIOLOGICAL STUDIES PROGRAM (DOSE ASSESSMENT MODELING)**

GENERAL TECHNICAL APPROACH

- **GATHER SITE-SPECIFIC METEOROLOGICAL AND AIR QUALITY DATA**
 - **FIVE METEOROLOGICAL TOWERS**
 - **TWO PARTICULATE SAMPLING LOCATIONS**

- **ACQUIRE REGIONAL METEOROLOGICAL DATA**

- **DEVELOP A "PICTURE" OF THE ATMOSPHERE IN AND AROUND THE YUCCA MOUNTAIN AREA**

TECHNICAL QUESTIONS

- 1. HOW AND WHERE ARE EMISSIONS FROM YUCCA MOUNTAIN DISPERSED BY WINDS?**
- 2. WHAT ARE THE MAGNITUDES OF STORMS THAT WILL AFFECT FACILITIES?**
- 3. WHAT IS THE EFFECTIVE PRECIPITATION IN THE YUCCA MOUNTAIN AREA?**
- 4. WHAT EFFECT WILL SITE CHARACTERIZATION ACTIVITIES HAVE ON THE EXISTING CONCENTRATIONS OF PARTICULATES AND POLLUTANT GASES?**
- 5. WILL SITE CHARACTERIZATION ACTIVITIES AT YUCCA MOUNTAIN HAVE AN EFFECT ON VISIBILITY?**

TECHNICAL QUESTION 1: HOW AND WHERE ARE EMISSIONS FROM YUCCA MOUNTAIN DISPERSED BY WINDS?

TECHNICAL APPROACH

- **ESTABLISH CONTINUOUS MONITORING OF METEOROLOGICAL PARAMETERS, I.E. WINDS, ATMOSPHERIC STABILITY**
- **DETERMINE THE DISPERSION PATTERNS**
- **PERFORM DETAILED ANALYSIS OF DISPERSION TRAJECTORIES UTILIZING APPROPRIATE TERRAIN MODEL**

DETERMINATION OF DISPERSION PATTERNS

- **APPLY A SIMPLE DIFFUSION MODEL AS A “FIRST GUESS” OF A WORST-CASE EMISSION RELEASE**
- **REFINE THE FIRST GUESS USING AN APPROPRIATE TERRAIN MODEL**

POTENTIAL TERRAIN MODELS

- **VALLEY 5**

- MULTI-USE POLAR GRID MODEL USED PRIMARILY IN AREAS OF SIGNIFICANT TERRAIN RELIEF

- **COMPLEX 1**

- CALCULATES POLLUTANT CONCENTRATIONS FROM POINT SOURCES IN AREAS OF COMPLEX TERRAIN

TECHNICAL QUESTION 1 (CONTINUED)

STATUS

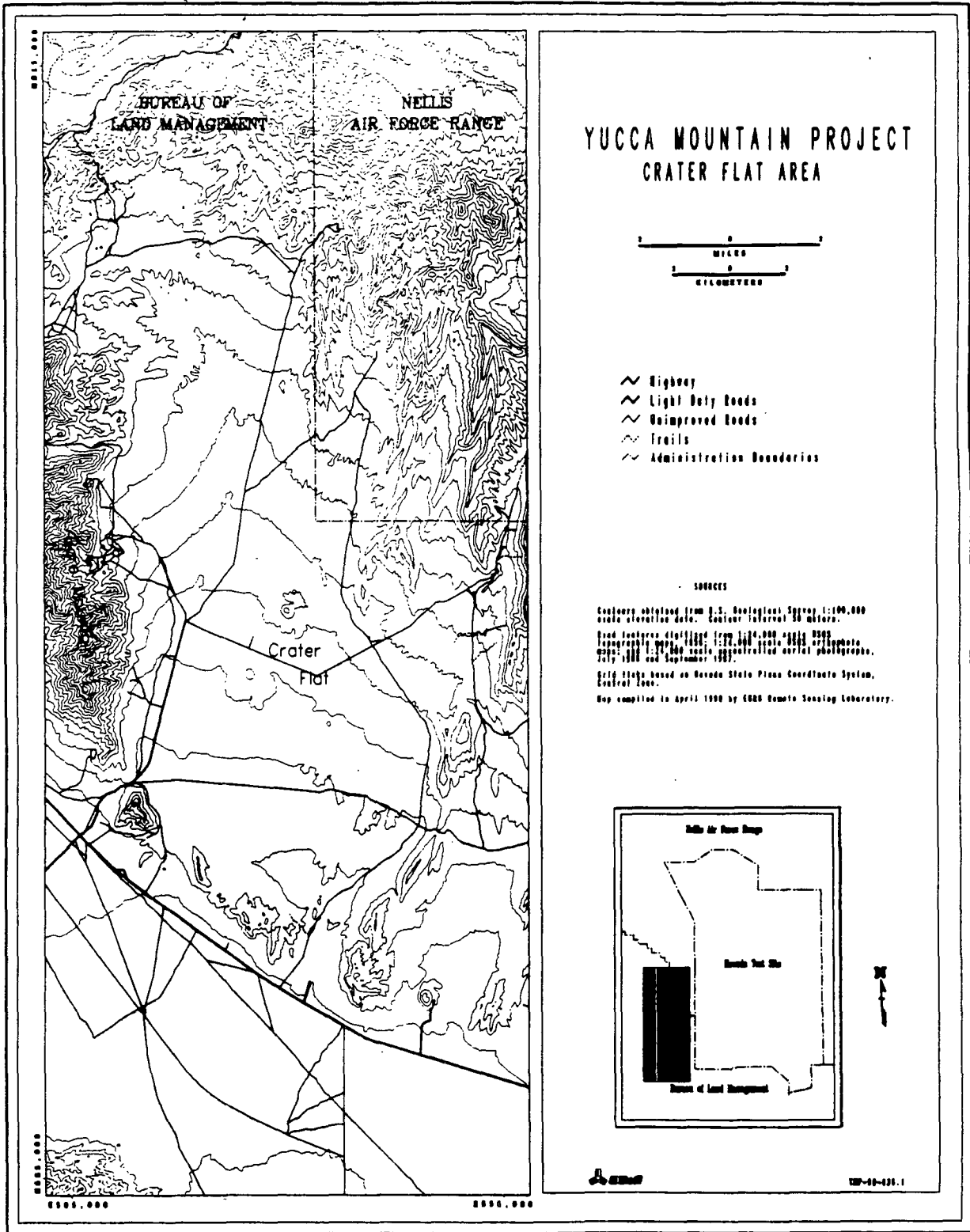
- **CONTINUOUS METEOROLOGICAL MONITORING AT FIVE SITES IS ONGOING**
- **SITING OF SECOND 60-METER TOWER IN CRATER FLAT TO SUPPORT AIR QUALITY AND RADIOLOGICAL STUDIES PROGRAM TO BEGIN 6/90 TO ASSURE CONSISTENCY WITH UPDATED QUALITY PROGRAM**
- **METEOROLOGICAL DATA ANALYSIS DELAYED DUE TO VERIFICATION/VALIDATION EFFORT ON QUALITY-RELATED SOFTWARE REVIEW**

TECHNICAL QUESTION 1 (CONTINUED)

ACCOMPLISHMENTS

- **METEOROLOGICAL MONITORING PLAN (MMP) RELEASED 1985 AND REVISED 4/89**
- **OVER FOUR YEARS OF SITE-SPECIFIC METEOROLOGICAL DATA COLLECTED**
- **THREE YEARS OF DATA HAVE BEEN ANALYZED**
- **IMPLEMENTATION OF TOTAL QUALITY ASSURANCE PROGRAM**

AREA FOR PROPOSED LOCATION OF NEW 60-M TOWER



TECHNICAL QUESTION 2: WHAT ARE THE MAGNITUDES OF STORMS THAT WILL AFFECT THE SITE?

TECHNICAL APPROACH

- **REVIEW PAST NEVADA TEST SITE STUDIES OF STORMS**
- **CLASSIFY STORMS BY INTENSITY**
- **DETERMINE THE PROBABILITIES OF THESE STORM INTENSITIES AT YUCCA MOUNTAIN**

TECHNICAL QUESTION 2 (CONTINUED)

STATUS

- **RECEIVED PERIOD-OF-RECORD DATA FOR REGIONAL STATIONS FROM WESTERN REGIONAL DATA CENTER (DRI, RENO) IN FALL 88**
- **WILL REQUEST SECOND DATA SET FALL 90 FOR PERIOD FALL 88 – FALL 89**
- **PLAN TO BEGIN ANALYSIS OF DATA IN FY 91**

TECHNICAL QUESTION 3: WHAT IS THE EFFECTIVE PRECIPITATION IN THE YUCCA MOUNTAIN AREA?

TECHNICAL APPROACH

- **ASSIST USGS IN DESIGNING, PROCURING, AND INSTALLING AN EXPANDED PRECIPITATION MONITORING NETWORK**
- **PROVIDE ANALYSIS AND INTERPRETATION SUPPORT TO USGS FOR PRECIPITATION DATA**

TECHNICAL QUESTION 3_(CONTINUED)

STATUS

- **PRELIMINARY STATION NETWORK DESIGN DEVELOPED 1/89**
- **USGS EFFORT IS PLANNED**

TECHNICAL QUESTION 4: WHAT EFFECT WILL SITE CHARACTERIZATION ACTIVITIES HAVE ON THE EXISTING CONCENTRATIONS OF PARTICULATES AND POLLUTANT GASES?

TECHNICAL APPROACH

- **DETERMINE EXISTING CONCENTRATION OF AIR POLLUTANTS**
- **CONTINUE MONITORING OF AIR POLLUTANTS DURING SITE CHARACTERIZATION**
- **DETERMINE CONTRIBUTION OF SITE CHARACTERIZATION ACTIVITIES TO AIR POLLUTANT CONCENTRATIONS**

TECHNICAL QUESTION 4

(CONTINUED)

STATUS

- **PARTICULATE SAMPLING IS ONGOING: SAMPLES TAKEN EVERY SIXTH DAY AT TWO SITES**
- **ANALYSIS OF PARTICULATE DATA DELAYED DUE TO VALIDATION/VERIFICATION EFFORT ON QUALITY-RELATED SOFTWARE REVIEW TO ASSURE CONSISTENCY WITH UPDATED QUALITY PROGRAM**
- **EXPECT TO INSTALL CRITERIA POLLUTANT MONITORING EQUIPMENT AT PARTICULATE MONITORING STATIONS 6/90**

TECHNICAL QUESTION 4 (CONTINUED)

ACCOMPLISHMENTS

- **ENVIRONMENTAL FIELD ACTIVITY PLAN (EFAP) FOR AIR QUALITY RELEASED 8/88**
- **EFAP WILL BE UPDATED TO INCLUDE CRITERIA POLLUTANT FIELD OPERATIONS**
- **ONE YEAR OF SITE-SPECIFIC PARTICULATE DATA COLLECTED BY 5/90**
- **IMPLEMENTATION OF TOTAL QUALITY ASSURANCE PROGRAM**

AIR QUALITY MONITORING

- **TOTAL SUSPENDED PARTICULATE MATTER (TSP)**
- **PARTICULATE MATTER LESS THAN 10 MICRONS IN AERODYNAMIC DIAMETER (PM₁₀)**
- **SULFUR DIOXIDE (SO₂)**
- **OXIDES OF NITROGEN (NO_x)**
- **CARBON MONOXIDE (CO)**
- **OZONE (O₃)**

TECHNICAL QUESTION 5: WILL SITE CHARACTERIZATION ACTIVITIES AT YUCCA MOUNTAIN HAVE AN EFFECT ON VISIBILITY?

TECHNICAL APPROACH

- **ANALYSIS IN ENVIRONMENTAL ASSESSMENT (EA) FOR YUCCA MOUNTAIN CONSERVATIVELY ESTIMATED PARTICULATE EMISSIONS OF 13.2 TONS/YR; REGULATORY LIMIT IS 250 TONS/YR FOR PSD REVIEW**
- **ESTIMATED PARTICULATE EMISSIONS MAY ALSO BE CONTRASTED TO NEARBY COMPARABLE OPERATIONS**
- **AS A RESULT OF RECENT ANALYSES, ESTIMATED PARTICULATE EMISSIONS SHOWN TO BE LESS THAN 3 ORDERS OF MAGNITUDE LESS THAN AT BULLFROG MINE**

TECHNICAL QUESTION 5 (CONTINUED)

TECHNICAL APPROACH (CONTINUED)

- **WILL MAINTAIN MONITORING OF PARTICULATE EMISSIONS AS SITE CHARACTERIZATION ACTIVITIES COMMENCE**
- **CONCEPTUAL MODEL RELATING AMBIENT PARTICULATE CONCENTRATION TO METEOROLOGICAL CONDITIONS AT SITE WILL BE DEVELOPED**

TECHNICAL QUESTION 5 (CONTINUED)

STATUS

- **EA ANALYSIS PROJECTED NO SIGNIFICANT ADVERSE IMPACT TO VISIBILITY DURING SITE CHARACTERIZATION PHASE**
- **FURTHER VISIBILITY ANALYSES WILL BE CONDUCTED POST-EIS SCOPING**

INTERDISCIPLINARY INTERACTIONS

- **METEOROLOGICAL AND AIR QUALITY DATA SUPPLIED TO RADIOLOGICAL STUDIES PROGRAM FOR USE IN DOSE ASSESSMENT STUDIES**
- **AIR QUALITY AND METEOROLOGICAL DATA SUPPLIED TO REFERENCE INFORMATION BASE (RIB) FOR USE BY OTHER PROJECT PARTICIPANTS**

TWO EXAMPLES ARE:

- **USGS: CLIMATOLOGICAL/PRECIPITATION STUDIES**
- **EG&G: RECLAMATION FEASIBILITY STUDIES**

- **WILL ACCESS INFORMATION FROM NATIONAL WEATHER SERVICE, BUREAU OF LAND MANAGEMENT, NEVADA COOPERATIVE EXTENSION, AND OTHER LOCAL NETWORKS**
- **FIELD FACILITIES SHARED WITH RADIOLOGICAL STUDIES AND TERRESTRIAL ECOSYSTEMS FIELD PROGRAMS**